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Dated: September 10, 2003

Signature:

Valerie Cohen
(Valerie Cohen)

Docket No.: 249212013300
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of:
George A. SALIBA

Application No.: 09/577,637

Group Art Unit: 2177

Filed: May 24, 2000

Examiner: M. Ali

For: DATA STORAGE DEVICES FOR LARGE-
SIZE DATA STRUCTURES

BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

This brief is in furtherance of the Notice of Appeal, filed in this case on July 10, 2003.

The fees required under § 1.17(c) and any required petition for extension of time for filing this brief and fees therefore, are dealt with in the accompanying Fee Transmittal.

This brief is transmitted in triplicate.

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This brief contains items under the following headings as required by 37 C.F.R. § 1.192 and M.P.E.P. § 1206:

- I. Real Party In Interest
- II. Related Appeals and Interferences
- III. Status of Claims
- IV. Status of Amendments
- V. Summary of Invention
- VI. Issues
- VII. Grouping of Claims
- VIII. Arguments
- IX. Claims Involved in the Appeal
- Appendix A Claims

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

Quantum Corporation, a California corporation, with a principal place of business in San Jose, California, is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

There are no known related appeals or interferences, which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-31 are pending in the present application.

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A. Current Status of Claims

1. Claims canceled: 0
2. Claims withdrawn from consideration but not canceled: 0
3. Claims pending: 1-31
4. Claims allowed: 0
5. Claims rejected: 1-31

B. Claims On Appeal

The claims on appeal are claims 1-31.

IV. STATUS OF AMENDMENTS

No amendments to the application were submitted after final rejection.

V. SUMMARY OF INVENTION

The claimed inventions are directed to data storage devices. For example, claim 1 is directed to a method of configuring a tape storage medium for recording a data file having a finite size. In the method claimed in claim 1, a logical cylinder is defined on the storage medium. The tape storage medium comprising a single magnetic tape, and the logical cylinder comprising at least one storage ring and being located entirely on a portion of the tape. The data file is recorded on at least one storage ring. A length of the logical cylinder is dynamically allocated based on a size of the data file. (See pages 7-8 and FIG. 2).

VI. ISSUES

Whether independent claims 1, 8, 16, 21, 26 are anticipated by U.S. Patent No. 5,403,639 (the Belsan reference) under 35 U.S.C. § 102(b). More particularly, whether the Belsan reference

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discloses that the logical cylinder disclosed in the Belsan reference is located entirely on a portion of a single recording medium.

VII. GROUPING OF CLAIMS

For purposes of this appeal brief only, and without conceding the teachings of any prior art reference, the claims have been grouped as indicated below:

Claims 1-31 stand or fall together.

VIII. ARGUMENTS

In an Office Action mailed on August 22, 2002 (Paper No. 8), the Examiner rejected claims 1, 4-7, 16-20, and 26-31 under 35 U.S.C. 102(b) as being anticipated by US Patent No. 5,403,639 (the Belsan reference), and claims 2, 3, 8-15, and 21-25 under 35 U.S.C. 103(a) as being unpatentable over the combination of the Belson reference and US Patent No. 4,445,195 (the Yamamoto reference). In a Response dated November 22, 2002, Applicant amended claims 1, 2, 4-12, 14-22, 26-28, and 31. In a Final Office Action mailed on February 10, 2003 (Paper No. 11), the Examiner maintained the rejection of the pending claims (claims 1-31). Applicant respectfully requests reversal of the rejection of the pending claims in view of the following remarks.

A. Independent Claims 1, 8, 16, 21, 26

As noted in the Response dated November 22, 2002, Applicant amended the independent claims to clarify that a logical cylinder is located entirely on a portion of a single recording medium, such as a magnetic tape. More particularly, claim 1 recites, "said logical cylinder comprising at least one storage ring and being located entirely on a portion of the magnetic tape." Claim 8 recites, "at least one logical cylinder extending along the longitudinal recording direction of the single magnetic tape and being located entirely on a portion of the single magnetic tape." Claim 16 recites, "the logical cylinder being located entirely on a portion of the single storage medium." Claims 21 and 26 recite, "the logical cylinder being located entirely on a portion of the single recording medium."

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Additionally, in the Response, Applicant asserted that the Belsan reference describes a system in which tracks of multiple disk drives having the same physical track address (e.g., tracks located on "stacked" disk drives under a read/write head) are grouped together and accessed as logical cylinders. Thus, the logical cylinders described in the Belsan reference are a set of physical tracks from different disk drives (i.e., from different recording media).

In the Final Office Action, the Examiner asserted that the Belsan reference teaches the limitation of "a logical cylinder is located on a portion of a single recording medium" as "the logical cylinder number identifies uniquely and the logical address is used as a confirmation for cylinders located for data integrity considerations (col. 18, lines 1-6, et seq., Fig. 12)." More particularly, in maintaining the rejection of claim 1, the Examiner asserted that the claimed step of "logical cylinder comprising at least one storage ring and being located entirely on a portion of the magnetic tape" is disclosed in Belsan as the set of data set constitute a portion of a single volume and stored in a magnetic tape in a file server system (col. 3, lines 16-34 et seq., Fig. 2). Applicant asserts that these cited portions of the Belsan reference do not disclose that the logical cylinder disclosed in the Belsan reference are located on a portion of a single recording medium.

Column 3, lines 16-34, of the Belsan reference disclose that a disk array in combination with a backend automated magnetic tape cartridge library system can be used as the media to store data:

The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that the file server system comprises a hierarchical data storage system containing multiple types of media.

Column 2, lines 36-41, disclose that the disk array comprises a plurality of small form factor disk drives that are interconnected into redundancy groups, each of which contain $n+m$ disk drives:

The-disk array data storage subsystem comprises a plurality of small form factor disk drives that are interconnected into redundancy groups, each of which contain $n+m$ disk drives for storing n segments of data and m

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redundancy segments in order to safeguard the integrity of the data stored therein. Each redundancy group functions as a large form factor disk drive which image is presented to the host processor.

Thus, even if a redundancy group is comprised of tape drives rather than disk drives, the Belsan reference teaches that the redundancy group is comprised of $n+m$ disk drives (i.e., multiple drives). Column 16, lines 1-12, disclose that a logical cylinder is a collection of all logical tracks within a redundancy group that can be accessed at a common logical actuator position, where a logical track is a set of all physical tracks in the redundancy group that have the same physical track addresses.

A redundancy group consists of $N+M$ disk drives. The redundancy group is also called a logical volume or a logical device. Within each logical device there are a plurality of logical tracks, each of which is the set of all physical tracks in the redundancy group which have the same physical track address. These logical tracks are also organized into logical cylinders, each of which is the collection of all logical tracks within a redundancy group which can be accessed at a common logical actuator position.

Column 18, lines 1-6, disclose that a logical cylinder sequence number uniquely identifies a logical cylinder that can be used to confirm the location of the logical cylinder, but, contrary to the Examiners assertion, this cited portion does not disclose that the logical cylinder is on a single medium:

The Logical Cylinder Sequence Number uniquely identifies the Logical Cylinder and the sequence in which the Logical Cylinders were created. It is used primarily during Mapping Table Recovery operations. The Logical Address is used as a confirmation of the Cylinders location for data integrity considerations.

In summary, the above-cited portions of the Belsan reference disclose:

1. a redundancy group is comprised of multiple drives (regardless of whether the drives are disk drives, tape drives, or combination of disk and tape drives);

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2. a logical cylinder is a collection of all logical tracks within the redundancy group (i.e., multiple drives) that can be accessed at a common logical actuator position; and
3. a logical cylinder sequence number is assigned to a logical cylinder.

Thus, regardless of the type of drives used (disk drives, tape drives, or combination of disk and tape drives); the Belsan reference discloses that a logical cylinder exists on multiple drives.

Note that the concept of a "common logical actuator position" is inconsistent with the assertion that the logical cylinder disclosed in the Belsan reference can exist on a single drive. More particularly, if the logical cylinder disclosed in the Belsan reference existed on only a single drive, there would not be a "common logical actuator position."

Therefore, Applicant asserts that the Belsan reference does not disclose each and every element of independent claims 1, 8, 16, 21, and 26.

B. Dependent claims 2-7, 9-15, 17-20, 22-25, and 27-31

Claims 2-7, 9-15, 17-20, 22-15, and 27-31 variously depend from independent claims 1, 8, 16, 21, and 26. As such, if the Examiner's rejection of the independent claims is reversed, Applicant asserts that these claims are allowable for at least the reason that they depend from allowable independent claims.

C. Conclusion

For the foregoing reasons, Applicant asserts that the Examiners rejection of claims 1-31 is erroneous and that these claims are patentable. Reversal of the rejection is therefore respectfully requested.

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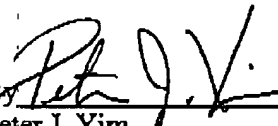
IX. CLAIMS INVOLVED IN THE APPEAL

A copy of the claims involved in the present appeal is attached hereto as Appendix A. The claims in Appendix A include the amendments filed by Applicant on November 22, 2002.

The Assistant Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. § 1.17 that may be required by this Brief on Appeal, or to credit any overpayment, to Deposit Account No. 03-1952 referencing attorney docket no. 249212013300.

Dated: September 10, 2003

Respectfully submitted,

By 
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Attached: Appendix A
(copy of claims involved in the Appeal)

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APPENDIX A

Claim 1 (Previously Presented): A method of configuring a tape storage medium for recording a data file having a finite size, comprising:

defining a logical cylinder on said storage medium, the tape storage medium comprising a single magnetic tape, said logical cylinder comprising at least one storage ring and being located entirely on a portion of the magnetic tape; and

recording, on the at least one storage ring, said data file;

wherein a length of said logical cylinder is dynamically allocated based on a size of the data file.

Claim 2 (Previously Presented): The method of claim 1, wherein the length of said logical cylinder is selected so that substantially one half of data selected from the data file is recorded in a first longitudinal direction of movement of the tape storage medium with respect to a recording head, and remaining data is recorded in an opposite longitudinal direction of movement of the tape storage medium with respect to the recording head.

Claim 3 (Original): The method of claim 2, wherein said the data recorded in the first longitudinal direction comprises data selected from a beginning portion and an end portion of the data file.

Claim 4 (Previously Presented): The method of claim 1, wherein the logical cylinder comprises a plurality of storage rings, and wherein different data files having substantially a same size as the size of the data file are stored in different storage rings of a same logical cylinder.

Claim 5 (Previously Presented): The method of claim 1, wherein recording includes tracking a servo track disposed on the tape storage medium and aligning a recording head with said storage ring based on said tracking.

Claim 6 (Previously Presented): The method of claim 1, wherein information about the logical cylinder and the at least one storage ring is recorded on the tape storage medium.

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Claim 7 (Previously Presented): The method of claim 1, wherein respective data files associated with respective single storage rings.

Claim 8 (Previously Presented): A magnetic tape data storage system for storing a data file, comprising:

a single magnetic tape having a longitudinal recording direction and a plurality of transversely spaced logical tracks;

at least one logical cylinder extending along the longitudinal recording direction of the single magnetic tape and being located entirely on a portion of the single magnetic tape; and

at least one data storage ring located entirely within a logical cylinder, said data file being recorded entirely on a single data storage ring.

Claim 9 (Previously Presented): The magnetic tape data storage system according to claim 8, wherein a longitudinal extent of the logical cylinder is dynamically allocated based on a size of the data file.

Claim 10 (Previously Presented): The magnetic tape data storage system according to claim 8, wherein the single data storage ring comprises at least two of the transversely spaced logical tracks and the transversely spaced logical tracks of the single data storage ring are recorded in opposite recording directions.

Claim 11 (Previously Presented): The magnetic tape data storage system according to claim 8, wherein the single data storage ring stores an identification field and a data storage field.

Claim 12 (Previously Presented): The magnetic tape data storage system according to claim 11, wherein the identification field is recorded on a magnetic recording surface of the single magnetic tape.

Claim 13 (Original): The magnetic tape data storage system according to claim 8, wherein each data storage ring can store in excess of 256 KBytes.

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Claim 14 (Previously Presented): The magnetic tape data storage system according to claim 8, wherein the single magnetic tape is between one and eight inches wide.

Claim 15 (Previously Presented): The magnetic tape data storage system according to claim 8, wherein the single magnetic tape also includes an optically detectable servo track disposed thereon.

Claim 16 (Previously Presented): A method of storing, on a single storage medium, a data file of finite size, comprising:

determining a size of the data file;

determining, from the size of the data file, a length of a storage ring on said single storage medium for recording said file on said storage ring; and

defining, on said single storage medium, a logical cylinder to accommodate said storage ring on said logical cylinder, the logical cylinder being located entirely on a portion of the single storage medium.

Claim 17 (Previously Presented): The method of claim 16, wherein said storage ring comprises two substantially parallel logical tracks, with the logical tracks being recorded in opposite recording directions.

Claim 18 (Previously Presented): The method of claim 16, wherein said single storage medium comprises logical tracks arranged in a circular pattern and wherein a contiguous portion of said circular pattern defines the storage ring.

Claim 19 (Previously Presented): The method of claim 18, wherein said single storage medium is a magnetic disk.

Claim 20 (Previously Presented): The method of claim 18, wherein said single storage medium is a cylinder having a magnetic recording surface.

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Claim 21 (Previously Presented): A data storage device comprising:

a recording head assembly having a recording head and a servo head operatively connected to the recording head;

a recording medium capable of being positioned relative to the recording head assembly for recording data in a longitudinal recording direction; and

a control interface for receiving data of a file to be recorded on the recording medium and positioning information for positioning the recording medium relative to the recording head assembly;

wherein said file data is recorded on said recording medium as a logical ring located within a logical cylinder spanning a finite length on the recording medium, with all data for the entire file being stored in a single logical ring on a single recording medium, the logical cylinder being located entirely on a portion of the single recording medium.

Claim 22 (Previously Presented): The data storage device of claim 21, wherein the recording medium is a magnetic tape.

Claim 23 (Original): The data storage device of claim 22, wherein the logical ring is defined by at least two logical tracks disposed within the logical cylinder.

Claim 24 (Original): The data storage device of claim 23, wherein the logical tracks are recorded in opposite longitudinal recording directions.

Claim 25 (Original): The data storage device of claim 21, wherein the recording head is positioned in response to position information transmitted by the servo head to the control interface.

Claim 26 (Previously Presented): A method of recording a data file as a logical ring on a single recording medium, comprising:

determining a file size of the data file;

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determining a ring size of the logical ring based on said file size;
defining, on said single recording medium, a logical cylinder to contain said logical ring, the logical cylinder being located entirely on a portion of the single recording medium; and
recording said data file in its entirety within said logical ring.

Claim 27 (Previously Presented): The method of claim 26, wherein an additional data file having substantially a same file size as the data file is recorded entirely on an additional logical ring located in the logical cylinder.

Claim 28 (Previously Presented): The method of claim 26, wherein the single recording medium is a magnetic tape and recording further comprises:

detecting a last one of previously recorded logical cylinders;
positioning a head assembly having a recording head in an area of the magnetic tape past an end indicator of a last previously recorded logical cylinder; and
moving at least one of the magnetic tape and the recording head relative to each other to record the data on at least two parallel logical tracks within the logical cylinder.

Claim 29 (Original): The method of claim 28, wherein the at least two parallel logical tracks are recorded in opposite recording directions.

Claim 30 (Original): The method of claim 28, wherein the at least two parallel logical tracks are recorded in the same recording direction.

Claim 31 (Previously Presented): The method of claim 26, wherein the recording medium is a magnetic disk and defining a logical cylinder includes allocating, on the magnetic disk, a contiguous circular recording track capable of recording said data file as a contiguous logical track.

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